We must have observatories where accurate and continuous observations are made. Our country is well situated to supplement the work of Europe, and we hope it will never fail to add its contribution to the annals of astronomy. American astronomers should keep pace in the improvements for increasing the ease and accuracy of making observations. The spectroscope has given a new element in the motions of the stars, not to speak of the interesting physical results obtained by its use. Photography will give great aid in determining the relative positions of the stars and in forming maps of the heavens. All new methods, however, will need examination and criticism, since they bring new sources of error. Fifty years ago, it was thought the chronograph would increase very much the accuracy of right ascensions. It has not done this directly to any great extent, but it has increased the ease and rapidity of observing. We must remember that astronomical results finally depend on meridian observations, and that it is the duty of astronomers to make these continuous from generation to generation. In this way, we shall gain the powerful influence of time to help control and solve our problems. There is one point where a reform may be needed from the dead weight of the large and expanding volumes sent forth by observatories and scientific institutions. The desire for publication is great, but the results should be well discussed and arranged, so that the printing may be shortened. Otherwise our publications may become burdensome, and when they are piled up in libraries some future Caliph Omar may be tempted to burn them. Even mathematics appears to labour under a similar oppression, and much of its printed matter may be destined to moulder to useless dust.

In the not distant future, stellar astronomy will become a great and interesting field of research. The data for the motions of the stars are becoming better known, but these motions are slow, and the astronomer of to-day looks with envy on the astronomer of a thousand years hence, when time will have developed these motions. Much may be done by the steady and careful work of observation and discussion, and the accumulation of accurate data. Here each one of us can add his mite. But the great steps of progress in science have come from the efforts of individuals. Schools and universities help forward knowledge by giving to many students opportunities to learn the present conditions, and from them some genius like Lagrange or Gauss may come forth to solve hard questions and to break the paths for future progress. This is about all the schools can do. We need a body of men who can give their lives to quiet and continuous study. When the young Laplace was helped to a position where he could devote his life to research, D'Alembert did more for the progress of astronomy than all the universities of Europe.

One needs only to glance at history to see how useful astronomy has been in the life of the world. It has wonderfully enlarged the universe and widened the views of men. It shows how law and order pervade the world in which we live; and by the knowledge it has disseminated and by its predictions it has banished many superstitions and fears. The sciences will continue to grow, and they will exert the same influence. The erroneous and dogmatic assertions of men will be pushed aside. In our new country, the energies of the people are devoted chiefly to commercial and political ends, but wealth is accumulating, leisure and opportunity will come, and we may look forward to a great development of scientific activity. We must be patient. Men do not change much from generation to generation. Nations that have spent centuries in robbery and pillage retain their dispositions and make it necessary for other nations to stand armed. No one knows when a specious plea for extending the area of civilisation may be put forth, or when some fanatic may see the hand of God beckoning him to seize a country. The progress of science and invention will render it more difficult for such people to execute their designs. A century hence it may be impossible for brutal power, however rich and great, to destroy a resolute people. It is in this direction that we may look for international harmony and peace, simply because science will make war too dangerous and too costly.

The influence of the sciences in bringing men of different nationalities into harmony is great. This is done largely by the common languages that are formed in each science. In mathematics, the language is so well formed and generally adopted that mathematicians all over the world have no trouble in understanding one another. It may be difficult to read Russian, but everyone can read the formulas of Tchebitchef and Lobaschewsky. In astronomy, the common language is nearly as well established, so that there is little difficulty in understanding the astronomy of different nations. A similar process is going on in chemistry, botany and in the other sciences. When men are striving for the discovery of truth in its various manifestations, they learn that it is by correcting the mistakes of preceding investigators that progress is made, and they have charity for criticism. Hence persecution for difference of opinion becomes an absurdity. The labours of scientific men are forming a great body of doctrine that can be appealed to with confidence in all countries. Such labours bring people together, and tend to break down national barriers and restrictions. The scientific creed is constantly growing and expanding, and we have no fears, but rejoice at its growth. We need no consistory of bishops, or synod of ministers, to tell us what to believe. Everything is open to investigation and criticism.

In our country we have one of the greatest theatres for national life that the world has ever seen. Stretching three thousand miles from ocean to ocean, and covering the rich valleys of the great rivers, we have a land of immense resources. Here is a vast field for scientific work of various kinds. No doubt the men of the future will be competent to solve the problems that will arise. Let us hope that our national character will be just and humane, and that we may depart from the old custom of robbing and devouring weak peoples. Anyone who saw the confusion and waste in this city in 1862 might well have despaired of the Republic; and he who saw the armies of Grant and Sherman pass through the city in 1865 felt that he need fear no foreign foe: neither French emperor, nor English nobleman nor the sneers of Carlyle. To destroy a democracy by external force, the blows must be quick and hard, because its power of recuperation is great. The danger will come from internal forces produced by false political and social theories, since we offer such a great field for the action of charlatans. Our schools and colleges send forth every year many educated people, and it is sometimes disheartening to see how little influence these people have in public life. Those who are trained in the humanities and churches ought to be humane in dealing with other people, ready to meet great emergencies and powerful to control bad tendencies in national affairs. But this is rarely the case. On the other hand, the most unscrupulous apologists and persecutors have been educated men, and the heroes of humanity have come from the common people. This anomaly points to something wrong in the system of education, which should disappear. The increase and teaching of scientific ideas will be the best means of establishing simple and natural rules of life. Nature, and science her interpreter, teach us to be honest and true, and they lead us to the Golden Rule.

THE ASSOCIATION OF PUBLIC SCHOOL SCIENCE MASTERS.

ON Saturday last, the Association of Public School Science Masters held its annual meeting at the University of London. Sir A. W. Rücker, the president, took the chair, and in the morning the proceedings were of a business character. Rules were revised, officers and committee elected and reports read. It was decided that, in order to preserve the original intentions of the society, its members should consist of teachers of natural science in secondary schools and of not more than twenty others interested in such teaching. It transpired that the present membership is ninety-six and that the only large public school still unrepresented is St. Paul's.

The report of the subcommittee appointed to consider the question of entrance scholarships at Oxford and Cambridge was presented, and Mr. H. B. Baker announced that the suggestions to be offered to the universities, by invitation at a very early date, had been submitted to every member of the Association, with the result that an objection had been raised by but one member.

Prof. Tilden was elected president for the year 1904, Mr. C. E. Ashford was re-appointed secretary, while in order to lessen his work a new office of treasurer was created and filled by the election of Mr. J. Talbot, one of Mr. Ashford's colleagues, who will be able to render him useful assistance. It was arranged that the members of committee should retire by rotation and are not eligible to re-election until three years afterwards, this step being taken in order that the smaller schools might be represented upon the committee.

It will be remembered that the Association grew out of a

conference, and in the afternoon a similar one—the third of its kind—was opened. Three papers were read, the first of which, on the tyranny of Greek, was by Mr. J. Talbot, of Harrow. He said that the amount of Greek which boys did at school was too small to be of any use, and he suggested that its place should be taken by English and by science, though from the latter alone he considered that it was impossible to obtain literary style. Sir Michael Foster pleaded for elasticity of curriculum and no compulsory Greek, though he did not define what he would substitute for it. Prof. Armstrong argued that if science was studied, literary style could be acquired at the same time. In the end, the meeting agreed that compulsory Greek should not be required of candidates for entrance examinations at the universities.

Mr. E. C. Sherwood, of Westminster, in his address dealt with how to make practical work of any use in "a low big form." He was of opinion that lectures should be used to sum up and criticise the work of the previous lesson. Text-books in the laboratory he considered a snare and a delusion, and he maintained that notes should be roughly written at the time and copied out carefully in ink afterwards. In the discussion, however, a number of speakers characterised it as a mistake for any notes to be made away from the laboratory. Furthermore, Mr. Sherwood laid down that the aim of the very earliest course of chemistry and physics, especially if not preceded by a course of "nature-study," should be to train the powers of observation and description, as well as to give a familiarity with the nature and properties of the commoner substances and materials, and the object and application of the easier methods of manipulation. The "problem" and the heuristic element should not be prominent features.

The third paper consisted of a criticism, by Dr. T. J. Baker, of Birmingham, on the new syllabus for science in the matriculation examination of the University of London. In this contribution, it was pointed out that it is now possible to matriculate at London without offering any science at all. It was contended that a matriculation examination should test the grounding of candidates in this as well as in literary subjects. At the same time, there should be no incentive to specialisation as in the new science syllabus under consideration.

This contention was borne out by the fact that chemistry has been separated from physics and the latter divided into two sections each of which counts as a distinct subject. The standard of attainment required is too high and directly encourages specialisation. Dr. Baker would retain only chemistry and mechanics, the syllabus in the first case being limited in scope, but insisting upon thoroughness of treatment.

Sir A. W. Rücker, in the course of a well-considered speech, explained that the syllabus complied with Sir Michael Foster's desire for elasticity. He alluded to the difficulty of examining 2500 candidates practically at a fixed centre, and showed how the University had arranged to test the pupils of a school on the spot by means of the leaving examination recently devised.

WILFRED MARK WEBB.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

SIR MICHAEL FOSTER has decided to retain his seat in Parliament as member for the University of London. In a letter to Sir John Rotton, he says:—"The answers which you have received to the inquiry which you kindly made on my behalf give me so fully the assurance which I needed in order that I should feel justified in renouncing my intention to resign that I have decided to do so."

SIR WILLIAM TURNER, K.C.B., F.R.S., who has held the chair of anatomy in the University of Edinburgh since 1867, has been elected principal of the University.

THE *Lancet* states that the Bristol Health Committee has decided that the bacteriological work which has been done hitherto in the medical officer's department shall be for one year transferred to the University College, where it will be carried on by Prof. Stanley Kent at a cost of 200*l*.

A LABORATORY has been opened in the gardens of the Royal Botanic Society at Regent's Park, in which classes for instruction in botany and horticultural chemistry are held three days a week. Mr. E. J. Schwartz, demonstrator in botany at King's College, has been appointed director, and has now completed arrangements for the reception of pupils. The laboratory has been erected and equipped under the auspices of the Technical Education Board.

THE Carnegie Institution of Washington has adopted, *Science* says, a plan to encourage exceptional talent by appointing a certain number of research assistants. As a rule, the annual emolument will not exceed 200*l*., and no limitations are prescribed as to age, sex, nationality, graduation or residence. A person appointed will generally be expected to work under the supervision of a man of science known to the authorities of the Carnegie Institution. Applications for appointments may be presented by the head of a college, or by a professor, or by the candidate; they should be accompanied by a statement of the qualification of the candidate, of the research work he has done and of that which he desires to follow; also of the time for which an allowance is required.

IN a speech made at the opening of the Indian Industrial Exhibition in connection with the eighteenth Indian National Congress, the Gaekwar of Baroda referred to the question of education in India. The *Pioneer Mail* says that his Highness founded an institution called the Kala-Bhavan with departments in dyeing and weaving, carpentry and mechanical engineering, and with the object of diffusing technical education had branches of it set up in the various parts of the Raj; but the response among the people was so faint that after a time the institution had to be contracted within narrower limits. Until the means of the people and the material wealth of the country expand, there can be but little demand for the work which such institutes turn out. So far, the Kala-Bhavan nas done but little beyond providing skilled dyers for Bombay mills.

SCIENTIFIC SERIAL.

Journal of Botany, January.—Mr. E. S. Salmon traces out the characters and history of several mosses which, after a careful examination, he considers should be included under the species *Calyptopogon mnioides*, Schwaeg. The type specimen was collected in Chili, but others were obtained in Ecuador, Patagonia, New Zealand, Tasmania and Australia. This distribution is paralleled in the case of several other mosses, and a similar range was described for certain phanerogamous plants by Sir W. J. Hooker. The identity of these variously named forms receives confirmation by the presence of gemmæ which arise on the leaves.—Mr. E. G. Baker discusses Turræa, a genus belonging to the Meliaceæ, and in the main follows the classification laid down by Dr. Harms in the "Pflanzenfamilien." The African and Mascarene species are arranged separately, and in the former appear descriptions of two new species.—Two Hepatics new to Britain are recorded. *Kantia submersa* was gathered by Messrs. A. Wilson and J. A. Wheldon on Cockerham Moss, west Lancashire, and *Geocalyx graveolens* was discovered by Mr. S. M. Macvicar, in west Ross-shire.—Miss A. L. Smith, in the course of her description of a gooseberry disease caused by a form of Botrytis, mentions the appearance of a Peziza growing from a sclerotium, which also gave rise to *Sclerotinia Fuckeliana*.—A note on the localities of *Acorus Calamus* is contributed by Mr. Arthur Bennett.—A supplement to the *Journal* is devoted to notes on the drawings for "English Botany," by Mr. F. N. A. Garry. This work, generally known as Sowerby's "English Botany," bears tribute to the artist who drew the plates; the descriptions of the first edition were almost entirely written by Sir James E. Smith.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 11, 1902.—"On Certain Properties of the Alloys of the Gold-Silver Series." By the late Sir William **Roberts-Austen**, K.C.B., F.R.S., and Dr. T. Kirke **Rose**.

The earliest trial plate for testing the composition of the gold coinage was made in 1527, the year following the first introduction of the standard 916·6. This plate contained only 6·2 parts per 1000 of copper and was probably intended to consist of gold and silver only. All subsequent plates, however, down to that made in 1829, contained much larger amounts of copper.